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The Record and Delivery of Caries Prevention for Children in a Primary Care Setting: A Multi-Practice Collaborative Clinical Audit

Authors (name, qualifications, address):

1. Lara Zebic, BDS(Hons) MFDS RCPS(Glasg), Guy's Hospital, London SE1 9RT, UK.
2. Maryam Ezzeldin, BDS(Hons) MFDS RCS(Ed), University Dental Hospital, Heath Park, Cardiff, CF14 4XY.
3. Vedaant S Patel, BDS(Hons) MFDS RCPS(Glasg), Carpenders Park Dental Practice, London WD19 5BL, UK.
4. Amrita Chhina, BDS, Tewkesbury House Dental Practice, Gloucester GL20 5PR, UK.
5. Esha Nijran, BDS, Edgbaston Dental Centre, Birmingham B5 7NX, UK.
6. Vincent Cheung, BDS, New Road Dental Practice, Bromsgrove B60 2LA, UK.
7. Professor Avijit Banerjee, BDS MSc PhD (Lond) LDS FDS (Rest Dent) FDS RCS (Eng) FHEA. King's College London Dental Institute at Guy's Hospital, Kings' Health Partners, London. SE1 9RT, UK.

Key Words:

Audit, Caries Prevention, Risk/ susceptibility Assessment, MI, Minimum Intervention, Paediatric Dentistry, Oral Health, Quality Improvement, Clinical Governance

Abstract:

Introduction: A multi-practice collaborative audit assessing the record and delivery of preventive interventions for children in a primary care setting, with an objective of exploring the relationship between reported preventive practice and submitted NHS claim forms.

Methodology: Following a pilot audit and examiner calibration, retrospective analysis of 600 records relating to completed courses of treatment for paediatric patients was completed over two cycles, across four NHS dental practices. Between cycles, a best practice guidance document for caries-susceptibility (risk) assessment and susceptibility-appropriate prevention was distributed to GDPs in the practices, and a summary flow-chart placed in each surgery. Best practice in prevention was revised using clinical scenarios, and customisable pop-ups and take-home advice sheets were also developed.

Results: Caries-susceptibility identification improved in three of the four practices. There was an improvement in all six preventive domains assessed for patients identified as high/moderate susceptibility and in five domains for those as low susceptibility, although the threshold of 75% was not reached across all of them. The cases where the "Best Practice

Prevention" box was completed appropriately, according to the clinical record, increased from 18% to 27% at cycle 2. Results were analysed using the Chi Square test.
Conclusion: While claim form completion did not necessarily indicate that there was recorded provision of all the susceptibility-appropriate preventive interventions indicated, following the implementation of changes there were statistically significant improvements in the recorded provision of preventive care. Difficulties in objectively measuring the delivery of prevention based on the clinical record alone were highlighted.

Introduction:

Despite reports of improvements in oral health in the Child Dental Health Survey, inequalities in oral health still persist.[1] Caries remains the most prevalent oral disease experienced by paediatric patients, with 33,871 admissions for extractions under general anaesthesia due to caries in England in 2014-2015.[2,3] Nuttall *et al.*[4] noted that children with clinically obvious dental caries were significantly more likely to experience pain as well as an impact on their self-confidence and quality of life. The substantial impact of toothache can be avoided through caries prevention.[5]

This collaborative audit took place in Worcestershire, England where 20.9% of children aged 5 years have one or more decayed, missing or filled teeth.[6] In the 12 months prior to this audit 8,696 paediatric patients had attended for examination across the four collaborating practices, and with this in mind, it was considered relevant to assess the quality of preventive care delivered in such a primary care setting and work towards improving it.

The Steele Report highlights the need for a greater emphasis on prevention by NHS dental services, recommending a contract banding structure which explicitly recognises preventive activity and provides clearer incentives for improving the quality of care.[7] Reform of the current NHS dental contract has aimed to address this by introducing best practice process indicators into protopilot contracts.[8] These indicators measure whether the care provided to patients follows best practice in terms of prevention according to Delivering Better Oral Health (DBOH)[9] as well as National Institute for Health and Care Excellence (NICE)[10] guidance on recall intervals.

At present, the primary indicator for the delivery of preventive care is the "Best Practice Prevention" box, which was added to FP17 forms in 2012; it should be ticked if guidance as detailed in DBOH has been followed.[11] With contract reform in the pipeline, which is likely to be reliant on honest self-reporting of deliverable outcomes, it was also thought to be of

interest to consider whether the use of this tick-box reflects the clinical record of preventive care delivered.

Aims & Objectives:

The aim was to audit practitioner record of caries-susceptibility (risk) assessment and delivery of preventive measures to paediatric patients across four independent general dental practices. Also, to explore the relationship between reported preventive practice and submitted claim forms.

Objectives:

- Review clinical records to determine the extent of practitioner compliance with best practice guidelines for caries prevention in children.
- Assess the accuracy of “Best Practice Prevention” box completion in corresponding submitted claim forms.
- Develop and implement changes which could improve knowledge and support the record and delivery of preventive care to children in a primary care setting, then re-audit.

Method:

In addition to caries-susceptibility assessment, this audit concentrated on the provision of six key preventive domains: oral hygiene instruction (OHI), dietary advice (DA), fissure sealant application (FSA), topical fluoride application (TFA), home fluoride advice/prescription (HFA/P), and recall interval chosen (RIC).

For the purposes of this audit, DBOH alone did not provide sufficient guidance to objectively assess records with regards to caries-susceptibility assessment and appropriate recall intervals. For example, DBOH focuses on children “giving concern”, listing basic factors that increase susceptibility to caries in comparison to other published guidance (Table 1). It also only advises to “reduce recall interval” for children giving concern up to the age of six, referencing NICE guidance on intervals between oral health reviews.[9,10] Whereas, while the Scottish Dental Clinical Effectiveness Programme (SDCEP) also reference NICE in its guidance, it provides more explicit advice on choosing an appropriate recall interval based on a caries-susceptibility assessment.[12]

Hence, best practice procedures in preventive care were identified by reviewing a number of evidence-based guidelines and recommendations (Table 1). From this, a guidance document was developed against which the data collected would be compared. This

guidance document eventually formed part of the measures implemented to improve care and was disseminated to every general dental practitioner (GDP) in the participating practices following cycle 1.

Pilot Audit

A pilot audit improved the data collection sheet (Fig 1) and allowed for inter-auditor calibration. The same set of six anonymised records were assessed by each individual auditor before comparing and discussing results as a group.

Data Collection

Retrospective analysis of records was completed by six dentists across four general dental practices providing NHS care. 300 records were reviewed in each cycle; each auditor reviewed the records of 50 consecutive patients that had attended with a course of treatment marked complete, aiming for an even sample of records from each participating GDP in the practice. The first cycle was completed in February 2016 and the second cycle in May 2016.

The audit was limited to children under the age of 18 years, and those with an incomplete course of treatment (i.e. still in progress) were excluded. Selected patients were divided into “high/moderate” and “low” caries-susceptibility groups by auditors based on indicators within the clinical record (Table 2), and this was termed the “actual risk-status” during data collection. A data collection sheet was used with clear instruction and criteria outlined as a guide for all auditors (Fig 1). Information collected was collated and inputted into an electronic spreadsheet where it was analysed and the significance of the changes to recorded preventive practice achieved was assessed using the Chi Squared test.

Standards set:

The following standards were set for the collated data from all four practices:

- At least 75% of all patients should have a correctly assigned caries-susceptibility status recorded.
- Patient records should demonstrate the provision of tailored preventive care in line with best practice guidelines, according to the susceptibility status recorded. A minimum threshold of 75% applied to each of the six preventive care domains assessed.
- Claim forms submitted will have the “Best Practice Prevention” box ticked only if there is recorded provision of all six aspects of preventive care appropriate to the recorded susceptibility status, in line with best practice guidelines.

The standard of 75% was chosen with consideration given to results in similar audits by Waldon *et al*.[16] Hogg *et al*.[17] and Foley[18], and also to reflect a contract prototype which sets a threshold of 75% to achieve full points for preventive action as part of the best practice indicators in a points-based remuneration system.[8]

Current guidance on the completion of FP17 forms states that "it should be ticked if you have followed the guidance as detailed in DBOH";[11] It does not specify the necessary extent of compliance with the guidance before the box can be ticked. Therefore, when evaluating completion of the box in this audit, there was a requirement that it's completion indicated compliance with recommendations in their entirety.

Results:

Cycle 1 Results:

Auditors assigned 53% of patients to the "high/medium" caries-susceptibility group and 47% to the "low" susceptibility group according to indicators within the clinical record. In comparison to this, the accuracy of caries-susceptibility identification by clinicians fell just short of the standard at 72%. In addition, in 67% of cases where susceptibility was incorrectly identified, it was recorded to be lower than the "actual risk status" (Table 3).

For the 130 patients assigned to high/medium susceptibility categories by clinicians within the clinical notes, the recorded provision in five of the six preventive domains assessed was below the 75% threshold set; only RIC was above the threshold at 93.8% (Fig 3).
For the remaining 170 patients assigned by clinicians to a low susceptibility category, the recorded provision in four of the six preventive domains assessed was below the threshold set; RIC and FSA were above the threshold at 98.2% and 91.2% respectively (Fig 4).
According to the all-or-nothing criteria, the "Best Practice Prevention" box was ticked appropriately in only 9% of cases, and correctly left unticked in a further 9% of cases (Table 4).

Changes Implemented:

Cycle 1 results were presented to each practice and best practice in caries prevention was reinforced using the guidance document and example clinical scenarios. Electronic, customisable pop-ups/templates were developed to act as an aide-mémoire and to support record keeping. Customisable, take-home oral hygiene and diet advice sheets were also

made available. Finally, a flow-chart summary of the guidance document was placed prominently in every surgery (Fig 2).

Cycle 2 Results:

Auditors assigned 49% of patients to the “high/medium” susceptibility group, and 51% to the “low” susceptibility group. In comparison to this, the accuracy of susceptibility identification by clinicians fell by an overall 4% (percentage change). However, Chi Squared analysis suggests this change was not statistically significant (P=0.47) and susceptibility identification actually improved in three of the four practices. In cases where caries-susceptibility assessment was incorrect, the proportion of those recorded to be lower than the “actual risk status” reduced to 54% (Table 3). The two practices treating the most paediatric patients correctly identified caries-susceptibility in at least 90% of cases.

Clinicians recorded 133 patients to be of a high/moderate susceptibility category in the clinical notes, and for these patients the recorded provision in two of the six preventive domains assessed now reached the threshold set; TFA and RIC were at 75.9% and 97.7% respectively. The delivery of tailored OHI was just below the threshold at 73.7%. There were positive changes in all six domains, all of which were statistically significant (Fig 3).
For the 167 recorded as a low caries-susceptibility, the recorded provision of still just two preventive domains reached the threshold set: RIC and FSA. There were improvements in five of the six domains, in four of which the improvement was statistically significant (Fig 4). Appropriate FSA reduced by a percentage change of 0.8% but this was not statistically significant (P= 0.82).
The accuracy with which completion of the “Best Practice Prevention” box reflected the clinical record improved to 27% (Table 4).

Discussion:

Though the threshold set was not reached across all of the preventive care domains assessed, and some variation between practices existed, the audit demonstrated an effective implementation of changes across four independent practices with simple adaptations to allow integration according to facilities and resources. Significant movements towards best practice were made between cycles, particularly for patients clinicians saw to be of a high/moderate caries-susceptibility.

Literature reports that dentists’ attitudes towards prevention are positive and in a study by Yusuf *et al.*[19] there were high levels of self-reported routine provision of preventive care. Yet,

the same study also revealed low levels of knowledge on basic preventive messages, in particular on the recommendations on fluoride concentration for toothpastes and the recommended frequency of topical fluoride varnish application. Results from this audit appeared to concur with these findings since there was a high number of “Best Practice Prevention” boxes ticked in parallel with sub-standard levels of recorded preventive activity; the recorded provision of tailored oral hygiene instruction, dietary advice and home fluoride use/prescription was particularly poor for both high/moderate and low category patients. The criteria used required more than just “oral hygiene instruction given/diet advice given”, or words to that effect alone, as sufficient evidence of tailored advice. Hence a main focus of this project was on improving knowledge as well as record keeping with regards to preventive care.

A patient-focused caries-susceptibility assessment can identify those that are more likely to develop future caries and so it is a pivotal first step in the planning of appropriate, personalised preventive care plans.[20] There is evidence to suggest that by targeting and improving caries-susceptibility assessment, the quality of preventive care delivered can be improved.[21] Although this audit noted an overall reduction in the accuracy of susceptibility identification, this change was not statistically significant. Also, where susceptibility identification was incorrect, there was a shift towards an overestimation of susceptibility in cycle 2 from an underestimation in cases in cycle 1 (Table 3), and the proportion of high/moderate susceptibility patients receiving appropriate prevention according to the clinical record significantly improved. Positive changes in the delivery of preventive care are arguably most important for this group of patients, and since studies have seen a meaningful percentage of patients in low susceptibility groups still experience dental caries,[20] it raises the question whether the consequences of over-prescribing preventive care to patients in a low susceptibility group are as significant as under-prescribing to high/medium susceptibility patients.

The authors acknowledge that the use of an all-or-nothing approach with regards to assessing the completion of the “Best Practice Prevention” box is a limitation of this audit. It penalised clinicians equally regardless of their extent of compliance with best practice, however this ensured an objective methodology and was based on published guidance on the completion of FP17 forms, which appears to assume full compliance.[11] Improvements to the completion of this box could be attributed to the changes implemented that support record keeping in combination with the opportunity to discuss results and the correct use of this box with GDPs following cycle 1.

The audit highlighted difficulties in objectively measuring the delivery of preventive care through self-declaration or the clinical records alone against a single source of guidance which is open to subjective interpretation. It also demonstrated how a collaborative approach to clinical governance, and working with the wider oral healthcare team, may be useful in improving the quality of care on a larger scale. With the potential for cross-practice comparison and bench-marking, areas of strength or weakness for a practice/unit could then be addressed specifically. It seems that the future of quality improvement may be headed in that direction as the "Getting it Right First Time" programme expands to cover over 30 clinical specialities including oral and maxillofacial, and soon dentistry. It identifies and attempts to reduce variations in the way services are delivered and promotes the sharing of best practice between trusts.[22]

Underperformance in caries-susceptibility identification could now be explored on a practice-specific level by conducting more focused clinical audits and targeting changes as a result of this first project, rather than re-auditing all aspects at once. Future cycles are recommended to assess whether the improvements can be sustained in the long-term. This information could then be disseminated through local and regional practice networks to improve patient-focused, team-delivered minimum intervention oral healthcare to patients.

Conclusions:

As with many audits, there are challenges in making changes to established practice, and data collection is limited by the quality of clinical record keeping. This audit aimed to improve both the knowledge of current best practice and assess record-keeping with regards to the delivery of preventive care. Statistically significant improvements were made across four independent dental practices and this may be attributable to the collective changes implemented between the cycles. According to the results, claim form completion did not necessarily indicate that there was adequate recording of the provision of all the susceptibility-appropriate preventive interventions necessary. As health services are reoriented towards preventive-based minimum intervention oral healthcare delivery, it is prudent to consider compliance with published guidance and guidelines before measures of preventive action form part of a remuneration system.

Tables/ images:

Table 1. Sources of Existing Guidelines and Recommendations for “Best Practice” in Caries Prevention for Children

Professional Body	Publication
Public Health England	Delivering Better Oral Health: An Evidence-Based Toolkit for Prevention (2014)[9]
National Institute for Health and Care Excellence	Dental Checks: Intervals Between Oral Health Reviews (2004)[10]
Scottish Dental Clinical Effectiveness Programme	Prevention and Management of Dental Caries in Children (2010)[12]
Scottish Intercollegiate Guidelines Network	Dental Interventions to Prevent Caries in Children (2014)[13]
European Academy of Paediatric Dentistry	Guidelines on Prevention of Early Childhood Caries (2008)[14]
American Academy of Paediatric Dentistry	Guideline on Caries-Risk Assessment and Management for Infants, Children and Adolescents (2014)[15]

Table 2. Clinical Record Susceptibility (Risk) Factor Indicators.

High/Moderate Caries Susceptibility Indicators
Medically Compromised, Physical Disability or Special Needs
Active Caries and Previous Caries Experience
Active Orthodontic Treatment (Fixed or Removable Appliances)
High Sugar Diet
Poor Oral Hygiene
Reduced Salivary Flow Rate

Table 3. Breakdown of Incorrect Caries Susceptibility (Risk) Assessment

Incorrect Caries Risk Assessment	Cycle one, n = 85 (%)	Cycle two, n = 93 (%)
Susceptibility Recorded As Lower Than “Actual Risk”	57 (67)	50 (54)
Susceptibility Recorded As Higher Than “Actual Risk”	27 (32)	36 (39)
Susceptibility Not Recorded	1 (1)	7 (7)

Table 4. Breakdown of the Completion of the “Best Practice Prevention” box.

Best Practice Prevention Box Completion		Cycle one, n = 300 (%)	Cycle two, n = 300 (%)
Ticked	Should Be Ticked	27 (9)	71 (24)
Ticked	Shouldn’t Be Ticked	245 (82)	212 (71)
Not Ticked	Shouldn’t Be Ticked	26 (9)	11 (3)
Not Ticked	Should Be Ticked	2 (<1)	6 (2)

Fig 1. Data Collection Sheet

AN AUDIT OF CARIES PREVENTION FOR PAEDIATRIC PATIENTS ACROSS FOUR GENERAL DENTAL PRACTICES

Please use this data collection sheet along with the caries-risk and recall guidelines criteria attached.

*1 *OHI* given and stated - “OHI Given” or words to that effect only, will not be accepted.
*2 *Diet* advice given and stated - “Diet Advice Given” or words to that effect only, will not be accepted.
*3 Fissure sealants placed (or not placed) as indicated by risk status, or unless otherwise stated. If not applied, the reason must be stated (e.g. poor compliance, moisture control).
*4 *Topical fluoride* applied (or not applied if <3 years old). If not applied, the reason must be stated.
*5 Evidence of advice on the correct and suitable level of *fluoride for home use* for the recorded caries-risk. Advising the correct toothpaste fluoride concentration is accepted. “Advised to use adult-strength toothpaste” or words to that effect are accepted in substitution of 1350-1500ppm. All “High/Medium” risk patients aged 8 years and above must be prescribed the correct home fluoride products.
*6 Evidence of appropriate *recall period*: In “High/Moderate” risk patients the maximum recall period accepted is 6 months. Low risk patients - recall periods of up to 12 months are accepted.
*7 Evidence of completion of the *“best practice prevention box”* on FP17. Only ticked if all appropriate preventive measures were correctly undertaken, according to the caries-risk recorded by the clinician.

Alias Code	Pt Age (0-18yrs & months)	Actual caries risk according to criteria set by Guidelines (High/Medium or Low)	Caries Risk Status recorded by clinician (High/Medium/Low)	OHI given *1 (Yes/ No)	Diet advice given*2 (Yes/No)	Correct action taken with regards to Fissure Sealants*3 (Yes/ No)	Topical Fl correctly applied*4 (Yes/No)	Home fluoride correct*5 (Yes/No)	Recall period *6 (months)	Appropriate recall period set? (Yes/No)	'Best OH guidelines' tickbox ticked (Yes/No)	Should it have been ticked? *7 (Yes/No)

Fig 2. Best Practice Guidance Summary Flow Chart.

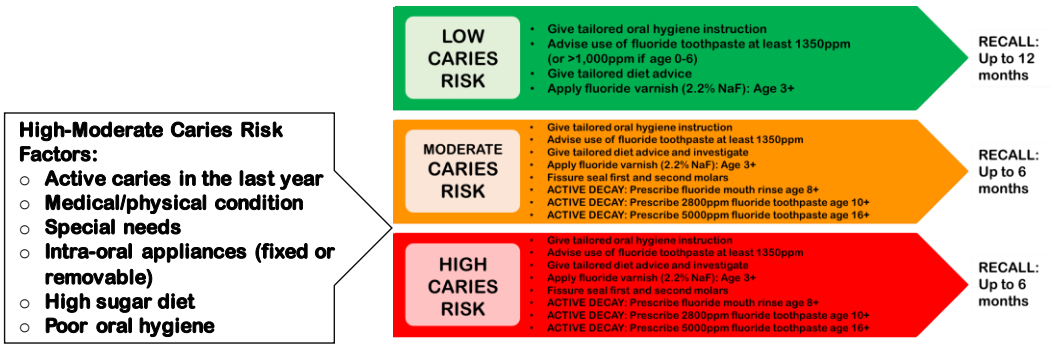
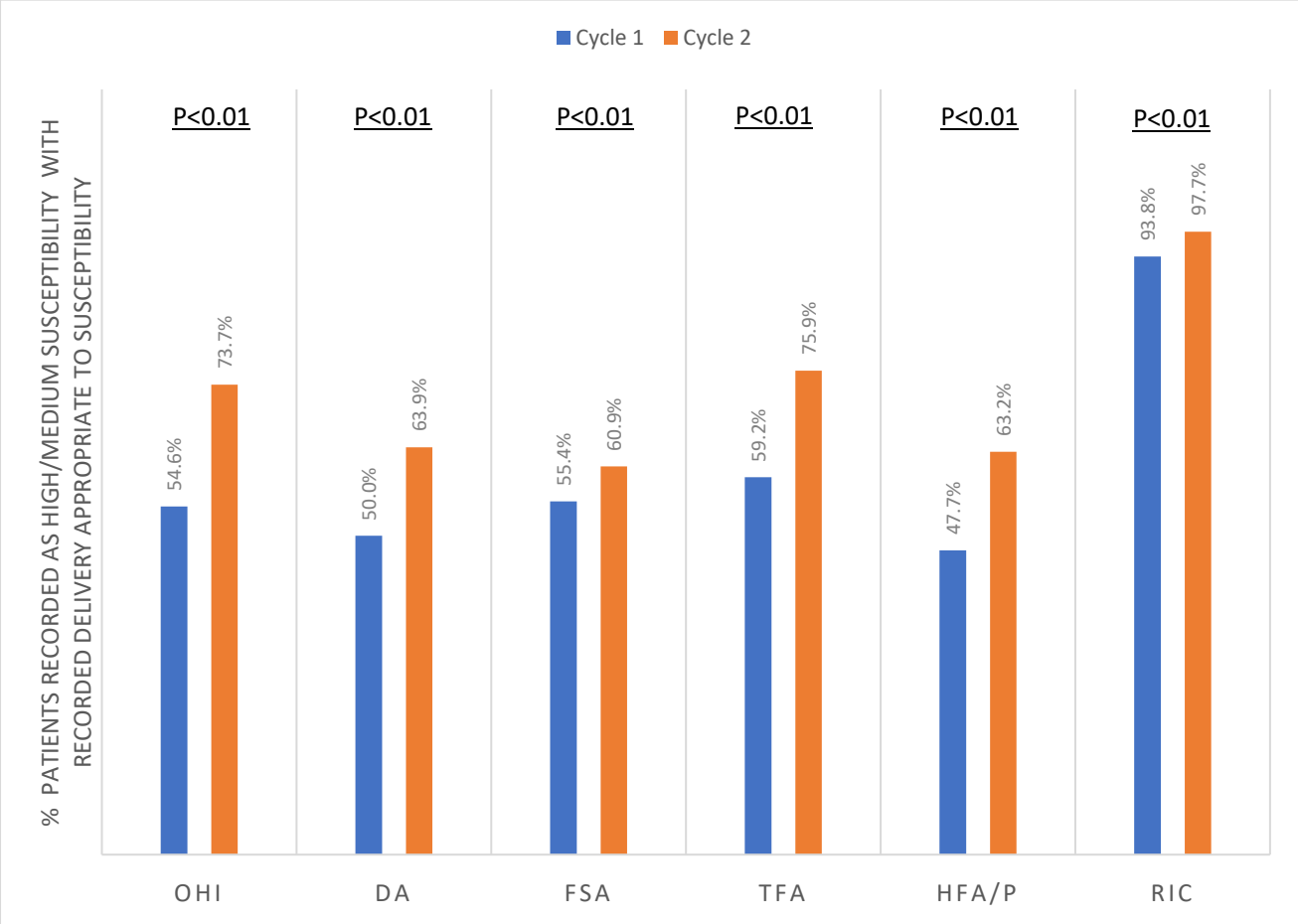
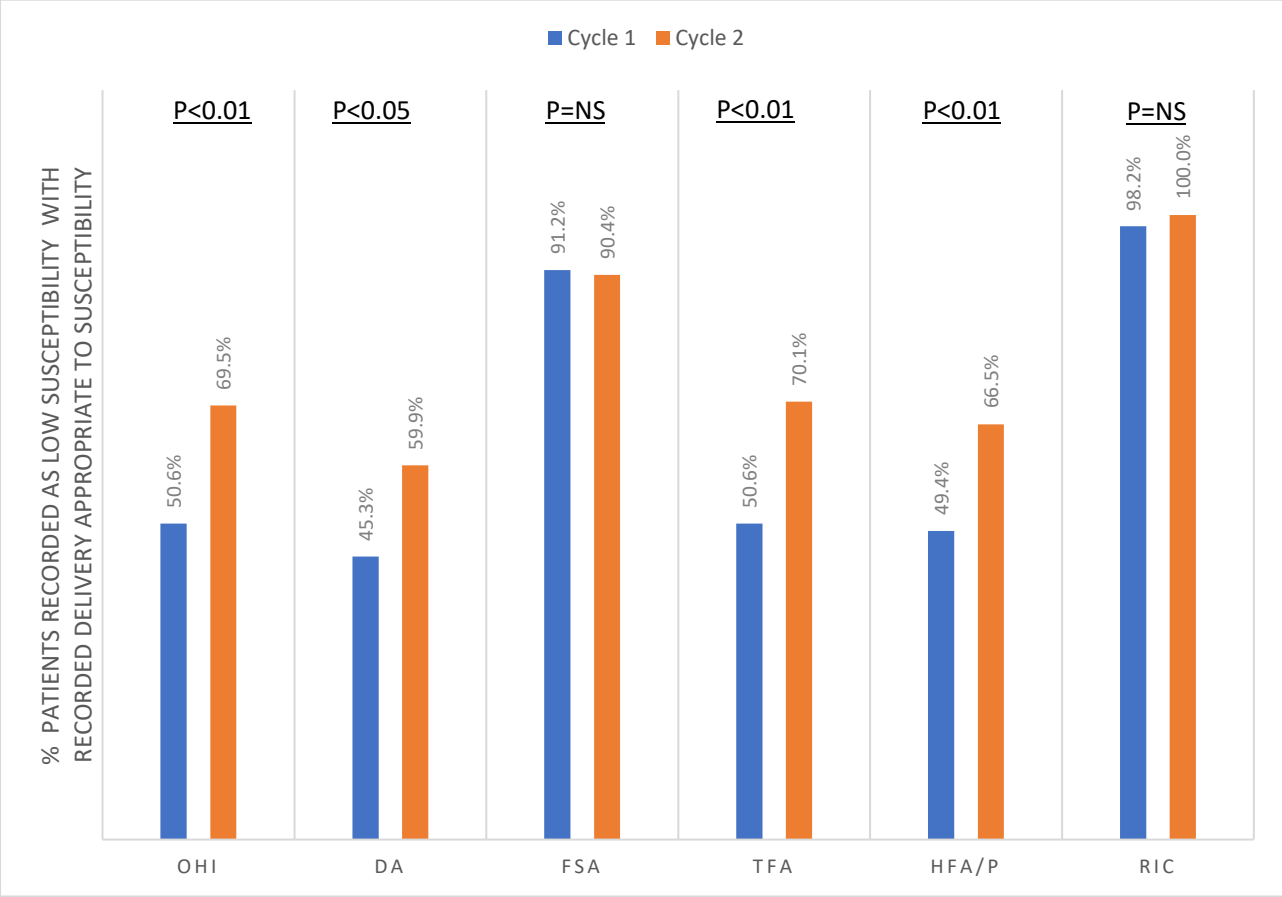


Fig 3. Changes in the recorded provision of preventive care for patients recorded to be of high/moderate susceptibility categories between Cycle 1 and Cycle 2.



Oral Hygiene Instruction (OHI) P<0.01; Dietary Advice (DA) P<0.01; Fissure Sealant Application (FSA) P<0.01; Topical Fluoride Application (TFA) P<0.01; Home Fluoride Advice/Prescription (HFA/P) P<0.01; Recall Interval Chosen (RIC) P<0.01.

Fig 4. Changes in the recorded provision of preventive care for patients recorded to be of low susceptibility categories between Cycle 1 and Cycle 2.



Oral Hygiene Instruction (OHI) P<0.01; Dietary Advice (DA) P=0.01; Fissure Sealant Application (FSA) P=0.82; Topical Fluoride Application (TFA) P<0.01; Home Fluoride Advice/Prescription (HFA/P) P<0.01; Recall Interval Chosen (RIC) P=0.10.

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